Applicants have added Claims 15-20. Claim 15 is supported by the disclosure on page 4, lines 11-23, page 5, lines 2-6 and original Claims 1, 2 and 9. Support for Claim 16 is found in original Claim 3, while support for Claim 17 is found in original Claim 4. Support for Claim 18 is found in original Claim 5, while Claim 19 is supported by original Claim 7, and Claim 20 is supported by original Claim 8. Moreover, applicants have corrected the dependencies of Claims 10-15.

Thus, no new matter is added to the application.

A marked-up version showing the changes made is appended to the Response. It is entitled "Marked-Up Version Showing Changes Made".

In support of the rejection of Claims 1-6, 10-11 and 13-14, the Office Action cites Motoki, et al.

The present application is directed to, inter alia, a method of manufacturing a nitrogen-based semiconductor layer grown on a hetero-substrate, comprising the steps of:

forming, on a surface of the nitrogen-based semiconductor layer, a protection layer composed of at least one material selected from a group consisting of Au, Pt, Ti-Au, Pd-Au, Ni-Au, Ti-Pt-Au, AuZn, and AuGe, so that the protection layer covers at least the surface of the nitrogen-based semiconductor layer; and

etching out the hetero-substrate by the use of an etchant for the hetero-substrate to leave the nitrogen-based semi-conductor layer.

Motoki, et al. are directed to a light emitting device obtained by forming a gallium nitride compound layer on a GaAs substrate and thereafter at least partially removing the GaAs substrate. In Motoki, et al., a gallium nitride compound layer is formed on a GaAs substrate, and thereafter the GaAs substrate is at least partially removed for forming the light emitting device.

Due to the removal of the GaAs substrate, the quantity of light absorption is reduced, relative to the device in which the GaAs is maintained.

There are differences between the subject matter of the present invention and the prior art. For example, Motoki, et al. do not teach, disclose or suggest forming a protection layer on the surface of the nitrogen based semiconductor, comprised of at least one material selected from the group consisting of Au, Pt, Ti-Au, Pd-Au, Ni-Au, Ti-Pt-Au, AuZn, or Au-Ge. Motoki, et al. teach the use of a protection layer comprised of GaN, identified therein as (6), which is a layer on the nitride mixed crystal layer (9), which is formed on the surface of the GaAs substrate (8). A review of Motoki, et al. quickly reveals that it does not mention the use of a material comprised of Au, Pt, Ti-Au, Pd-Au, Ni-Au, Ti-Pt-Au, AuZn, or AuGe. Moreover, a review of the cited reference clearly establishes that no protection layer comprised of the aforementioned materials is described or taught in Motoki, et al.

Case law has held that the exclusion of a claimed element from a prior art reference is enough to negate anticipation. Kalmau v. Kimberly Clark Corp., 713 F2d. 760, 771-772, 218 USPQ 781, 789 (Fed. Cir. 1983). Since the prior art reference does not disclose a protection layer comprised of the aforementioned materials recited in Claim 15, the prior art reference does not anticipate the subject matter therein.

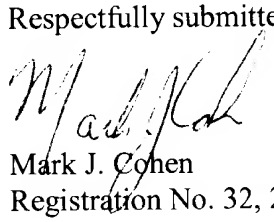
Even the United States Patent and Trademark Office should concur. Although Claim 15 was not present prior to the examination of the application, it is substantially equivalent to original Claim 9. Thus, inasmuch as original Claim 9 was found allowable if rewritten in independent form, since the subject matter in Claim 15 is written in independent form, the subject matter in Claim 15 is also allowable. This conclusion is consistent with the comments in the Office Action.

Since all of the remaining claims are ultimately dependent on Claim 15, either directly or indirectly, and since Claim 15 is equivalent to original Claim 9, which was found allowable if rewritten in independent form, and since Claim 15 is not anticipated by the prior art, the remaining claims are also allowable over the prior art. Please also note that Claims 19 and 20 are equivalent to original Claims 7 and 8, which the Office Action has indicated to be allowable if rewritten in independent form. Moreover, Claim 12, as amended, is equivalent to original Claim 12. Thus, for an additional reason, Claims 12, 19 and 20 are also allowable over the prior art.

Thus, the rejection of claimed subject matter under 35 U.S.C. §102(b) is obviated; withdrawal thereof is respectfully requested.

Thus, in view of the amendments to the claims and specification and the Remarks herein, it is respectfully submitted that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The paragraph beginning on Page 12, line 20 have been amended as follows:

As shown in Fig. 2B, a SiO_2 film 16 is deposited to a thickness of 200nm on the surface of the GaN film 15 and a protection film 17 is formed on the SiO_2 film 16. The illustrated protection film 17 is composed of a titanium (Ti) film of 50nm thick and a gold (Au) film of 0.4μm thick. After deposition of the protection film 17, a heat treatment is carried out at a temperature of 450°C for ten minutes within a hydrogen atmosphere.

The paragraphs beginning on Page 14, line 7 and ending on line 25 have been amended as follows:

As the protection film [35] 17 of the GaN thick film [35] 15, use is made of the Ti film of 50nm thick and the Au film of [0.5] 0.4μm thick in the example. However, the protection film [35] 17 may be formed by a material and a thickness that withstand the mixed solution of phosphoric acid and sulfuric acid. In the illustrated example, the SiO_2 film 16 underlies the protection film Ti-Au in order to avoid metallic contamination at a portion adjacent to the surface of the GaN thick film [35] 15. However, the SiO_2 film 16 may not be placed on the GaN thick film [35] 15.

As a material of the protection film [35] 17 placed over the GaN thick film [35] 15, is used Pt, Ti-Pt-Au, Ti-Pt, Au, Ni-Au, Al-Au, AuZn, AuGe, or the like, instead of Ti-Au. At any rate, the protection film [35] 17 may be formed by the material against the etchant of phosphoric acid and sulfuric acid.

In the above-mentioned example, the GaN buffer layer [32] 12 and the GaN thick film [35] 15 are deposited on the sapphire substrate [31] 11. However they are replaced by $In_xGa_{1-x}N$ ($0 \leq x \leq 1$), $Al_xGa_{1-x}N$ ($0 \leq x \leq 1$), and $Al_xIn_yGa_{1-x-y}N$ ($0 \leq x + y \leq 1$) or a lamina structure of them. In this event, an impurity of an n-type or a p-type may be added to each layer or film.

IN THE CLAIMS:

Claims 1-9 have been cancelled without prejudice.

Claims 10-14 have been amended as follows:

10. (Amended) A method as claimed in Claim [1] 15, wherein the nitrogen-based semiconductor layer includes either $In_xGa_{1-x}N$ ($0 < x < 1$) or $Al_xGa_{1-x}N$ ($0 < x \leq 1$) .

11. (Amended) A method as claimed in Claim [1] 15, wherein the nitrogen-based semiconductor layer includes at least two components selected from a group consisting of $In_xGa_{1-x}N$ ($0 \leq x \leq 1$), $Al_xGa_{1-x}N$ ($0 \leq x \leq 1$), and $Al_xIn_yGa_{1-x-y}N$ ($0 \leq x + y \leq 1$).

12. (Amended) A method as claimed in Claim [8] 20, wherein the sapphire is etched out by the use of the etchant kept at a temperature not lower than 300°C.

13. (Amended) A method as claimed in Claim [4] 17, wherein the nitrogen-based semiconductor device structure forms a semiconductor laser, a light emitting diode, and/or a field effect transistor.

14. (Amended) A method as claimed in Claim [1] 15, further comprising the step of:

polishing the nitrogen-based semiconductor layer on its surface faced to the provisional substrate so as to flatten the surface.

Claims 15-20 have been added as follows:

15. (New) A method of manufacturing a nitrogen-based semiconductor layer grown on a hetero-substrate, comprising the steps of:

forming, on a surface of the nitrogen-based semiconductor layer, a protection layer composed of at least one material selected from a group consisting of Au, Pt, Ti-Au, Pd-Au, Ni-Au, Ti-Pt-Au, AuZn, and AuGe, so that the protection layer covers at least the surface of the nitrogen-based semiconductor layer; and

etching out the hetero-substrate by the use of an etchant for the hetero-substrate to leave the nitrogen-based semi-conductor layer.

16. (New) A method as claimed in Claim 15, wherein the nitrogen-based semiconductor layer is formed by a nitrogen-based semiconductor thick film.

17. (New) A method as claimed in Claim 15, wherein the nitrogen-based semiconductor layer implements a nitrogen-based semiconductor structure.

18. (New) A method as claimed in Claim 16, further comprising the step of:

processing the nitrogen-based semiconductor substrate into a nitrogen based semiconductor element after the hetero-substrate is etched out.

19. (New) A method as claimed in Claim 17, wherein the protection layer is used as an electrode of the nitrogen-based semiconductor element.

20. (New) A method as claimed in Claim 15, wherein the hetero-substrate is a sapphire substrate while the etchant is formed by a mixed solution of phosphoric acid and sulfuric acid or another mixed solution including the phosphoric acid and the sulfuric acid.